A NEW SPARSE LOW-RANK MATRIX DECOMPOSITION METHOD AND ITS APPLICATION ON TRAIN PASSENGER ABNORMAL ACTION IDENTIFICATION

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Abstract: In the article a new sparse low-rank matrix decomposition model is proposed based on the smoothly clipped absolute deviation (SCAD) penalty. In order to overcome the computational hurdle we generalize the alternating direction method of multipliers (ADMM) algorithm to develop an alternative algorithm to solve the model. The algorithm we designed alternatively renew the sparse matrix and low-rank matrix in terms of the closed form of SCAD penalty. Thus, the algorithm reduces the computational complexity while at the same time to keep the computational accuracy. A series of simulations have been designed to demonstrate the performances of the algorithm with comparing with the Augmented Lagrange Multiplier (ALM) algorithm. Ultimately, we apply the model to an on-board video background modeling problem. According to model the on-board video background, we can separate the video background and passenger's actions. Thus, the model can help us to identify the abnormal action of train passengers. The experiments show the background matrix we estimated is not only sparser, but the computational efficiency is also improved.

Key words: *sparse, low-rank matrix, alternative algorithms, SCAD, abnormal action identification*

1. Introduction

It is well known that many countries have improved the video inspector ability of public facilities after the 911 terrorist attack. Many exception events (such as fighting, rubbing) happened sometimes in the trains. When passengers have some dangerous behavior, the video monitoring system identifies the abnormal action and

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